

# *Moina weismanni* Ishikawa, 1896, a rare East Palearctic faunistic element from S. W. Yugoslavia

(Crustacea, Cladocera)

By Swetozar T. Petkovski

Petkovski, S. T. (1991): *Moina weismanni* Ishikawa, 1896, a rare East Palearctic faunistic element from S. W. Yugoslavia (Crustacea, Cladocera). – Spixiana 14/1: 1-7.

*Moina weismanni* Ishikawa, 1896, till recently was known as a rare Far-Eastern faunistic element. Some time ago this species was introduced in Europe and to date evidenced in some ricefields of North Italy and in several inundation pools of the Pannonian lowland. Our discovery of the species in S. W. Yugoslavia shows that it succeeded to inhabit the Balkan Peninsula, too.

Based on specimens of both sexes collected from Macedonia a short description is given. In addition, some important features are emphasized. These include the form of the ephippium in dorsal aspect and the presence of rows of setae at the dorsal margin of the postabdomen in the female. In the male, the armature of the ventral shell rim and the first pair of legs, which are mutually asymmetrical, are also significant diagnostic characters.

Swetozar T. Petkovski, Prirodonaučen muzej na Makedonija, Bulevar Ilinden 86, Yu-91 000, Skopje 55, Yugoslavia

## Introduction

*Moina weismanni* Ishikawa is a rare anomopod 'cladoceran', which was described almost a century ago from the vicinity of Tokio and Sendai, Japan (Ishikawa, 1896). Shortly afterwards, in his cultures reared from dried mud taken from fish ponds and inundated rice fields in the neighbourhood of Puching, South China, Sars (1903) revealed an animal very similar to *M. weismanni*, which he described as a new species, *Moina brevicornis*. In his description Sars did not mention at all *M. weismanni* from Japan, probably because he was unaware of its existence. We find further reports on *M. weismanni* in the study of the Freshwater Branchiopoda of Japan (Uéno, 1927). Besides the new localities from Kirin, Southern Manchuria and Peking, China, Uéno gives here a short description of the species and a few illustrations of both sexes, but he says nothing about the structure of the ephippium, which affords the easiest means of recognising this species. In another study on the cladocera of Manchuria, Uéno (1939) writes about *M. weismanni* as follows (1939 p. 230): "May be said to be peculiar to the Far East". Brehm (1951) reported some incomplete facts about finding *M. weismanni* in Russey-Keo, Cambodia, based on poor and badly preserved material, and later (Brehm, 1953) reported some forms similar to *M. weismanni*, from Mandi fleuve, India, using a small number of intact specimens.

All reports after Ishikawa (1896) give only a few new facts which can be used for to enable *M. weismanni* to be recognized more convincingly.

Goulden (1968) in his monographical study about systematics and evolution of the family Moinidae, inter alia, gives a detailed redescription of *M. weismanni*, based on reexamination of Sars' type material from the area around Pucheng (sic), Southern China, at the time determined as *M. brevicornis*. However, in making illustrations of this species of Moina, Goulden limited himself to reproducing the original illustrations from Ishikawa (1896) to which he added his own figures of the habitus of the male and the armature of the ventral shell rim of female. However, textually this investigator significantly consolidated and improved the existing description of *M. weismanni*. In addition, he emphasized the main distinctions of this species in comparison with its closest relatives, *M. flexuosa* Sars, 1897 and *M. affinis* Birge, 1893. Smirnov (1976) took most important literature data about *M. weismanni* from Goulden (1968). In his distribution map (p. 202, Fig. 182) the data of *M. weismanni* are confused with those of *M. belli*. The latest report about finding of *M. weismanni* in the Asian continent is given by Markushin & Markewitch (1983) from the Namanganskoi District of Uzbekistan SSR. However, these Russian authors in their contribution have not concentrated on the problems concerning morphology and taxonomy, nor on zoogeography, but treated only the forming of the ephippium in *M. weismanni* as well as some other species of Cladocera.

In the European continent *M. weismanni* seems most probably as one introduced element. It was first registered in some ricefields of North Italy (Margaritora et al. 1987) and later in several localities in the Panonian part of Central Europe (Hudec, 1988, 1989).

I had the opportunity to study *M. weismanni* in some small waters in S. W. Yugoslavia. For the primary determination of my material I have used the determination keys for the species of the family Moinidae given in the works of Goulden (1968) and Smirnov (1976), as well as the descriptions given in the works of Margaritora et al. (1987) and Hudec (1988, 1989).

#### Material examined

One of the samples of *Moina weismanni* comes from a temporary road-side pool at Kosovo Polje, S. W. Serbia, on the main Skopje-Priština road. A small number of parthenogenetic and sexual females and a few males made up the zooplanktonic community with *Daphnia longispina* numerically the dominant species. The material was taken on September 12, 1973 by Dr. T. Petkovski. I collected the other two samples from astatic ditches with turbid water without aquatic vegetation, situated on the outskirts of a marsh at the Northern shore of the Prespa Lake in the vicinity of the village Ezerani, S. W. Macedonia. The samples were collected on August 3th and September 18th, 1987. Both samples contain numerous females and males of different ages, and include a considerable number of ephippial females. Numerous ephippia are also present in the samples. These came from the sediment of the ditches.

Co-existing species were the anomopod *Scapholeberis* sp. (juveniles), and the cyclopoid copepods *Cyclops vicinus* (copepodids only: few), *Eucyclops speratus* and *Mesocyclops leuckarti*.

#### Description

The detailed description of our specimens of *M. weismanni* given below has to certify that the populations of this species in the European area show almost identical morphological structure, but the problem of some differences between the European and the Far-Eastern populations remains unclarified, which may be due to their hitherto insufficient studying.

*Moina weismanni* is a small species, similar in general appearance to *M. micrura*, a common widespread species in the West Palaearctic.

#### Female

Parthenogenetic females vary in length from 0.64–0.88 mm. Sexual females are frequently smaller than parthenogenetic females and measure from 0.73–0.83 mm.

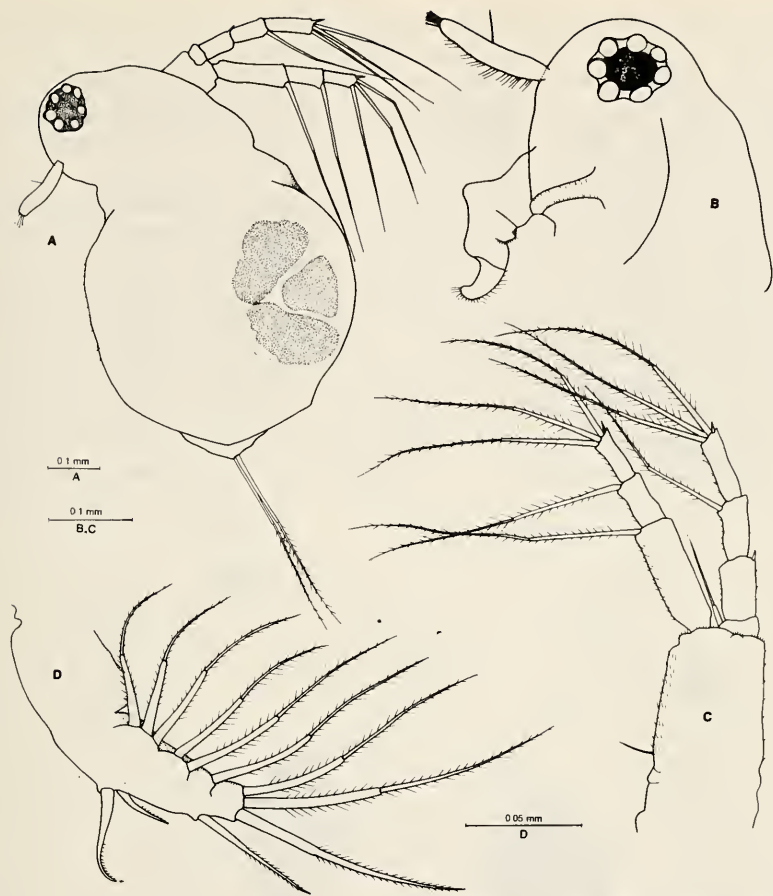


Fig. 1. *Moina weismanni* Ishikawa, 1896: A Parthenogenetic female, lateral view; B. Head of a female; C. Antenna of a female; D. First thoracic limb of a female.

The head (Fig. 1. B) is broadly rounded and has no wellmarked supraocular depression above the eye. There is a moderate sized compound eye, which is composed of a pigmented spot surrounded by great crystalline lenses. It lies usually close to the front of the head. The head is slightly elongated and rounded anteriorly, in dorsal view. Its ventral margin is scarcely indented, being continuous with the usually shaped and armed labrum. The dorsal margin of the head is distinctly convex and there is not trace of fine setules. The fornix extends over the eye. A deep depression separates the head from the carapace.

The antennula (Fig. 1. A, B) is relatively long and extends from the ventral margin of the head. It bears a single long, thin, sensory seta midway along its anterior margin. Along the posterior antennula margin are transverse rows of slender setules. Its tip bears long olfactory papillae.

The antenna (Fig. 1. C) is slender and in contrast to that of most other species of *Moina*, rather short, not extending beyond the posterior margin of the carapace. The large basipod has two well developed sensory setae near its base. These setae are almost two-thirds the length of the same segment. The sensory seta that arises on the distal end of the basipod between the two rami is almost half as long as the exopod. The basipod and the segments of the rami are each provided with setules arranged in transverse rows along their inner margins. Each of the first two segments of the endopod bears one seta di-

stally, while the last segment bears three long setae and a single short spine. The exopod is four-segmented. The short basal segment lacks setae. The second segment has only a short spine. The third segment has one long seta and the fourth segment has three long setae and a short spine.

The first thoracic limb (Fig. 1. D) is similar to those of other species of the genus. The slender anterior seta of the penultimate segment and the anterior well developed seta of the ultimate segment, are both armed with fine spinules.

The carapace (Fig. 1. A) may be oblong or rotund depending on the presence and number of embryos in the brood pouch. Its entire surface usually has a punctate appearance. At the dorsal and antero-ventral carapace surface no setules could be seen but such are present in the far eastern populations. The ventral carapace rim (Fig. 3. H) carries a row of 11–17 stout setae that extends backward along the margin, but only on the anterior two-thirds of the rim. The last third is provided with very short setules arranged in rows. Each row usually consists of 4–8 setules that increase in size posteriorly. The posterior carapace rim has a row, mostly of short ungrouped setules. There is a pair of elbow-shaped hooks, one on each valve, located ventrally just at the point of the shell junction.

The postabdomen (Fig. 2. D, E) has a large proximal, and a conical, narrowed distal part that ends in the distal claws. Its dorsal margin bears 10–11 transverse rows of slender setules. In addition, at the

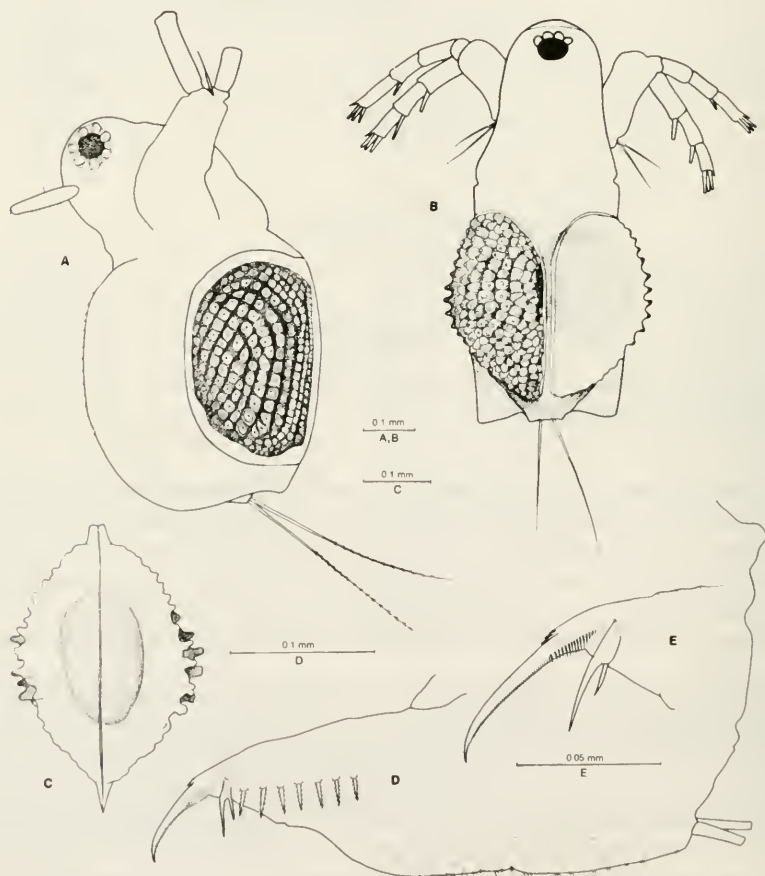


Fig. 2. *Moma weismanni* Ishikawa, 1896: A Sexual female, lateral aspect; B. Sexual female, dorsal aspect; C. Ephippium; D. Postabdomen of a female; E. Distal part of postabdomen of a female, enlarged.

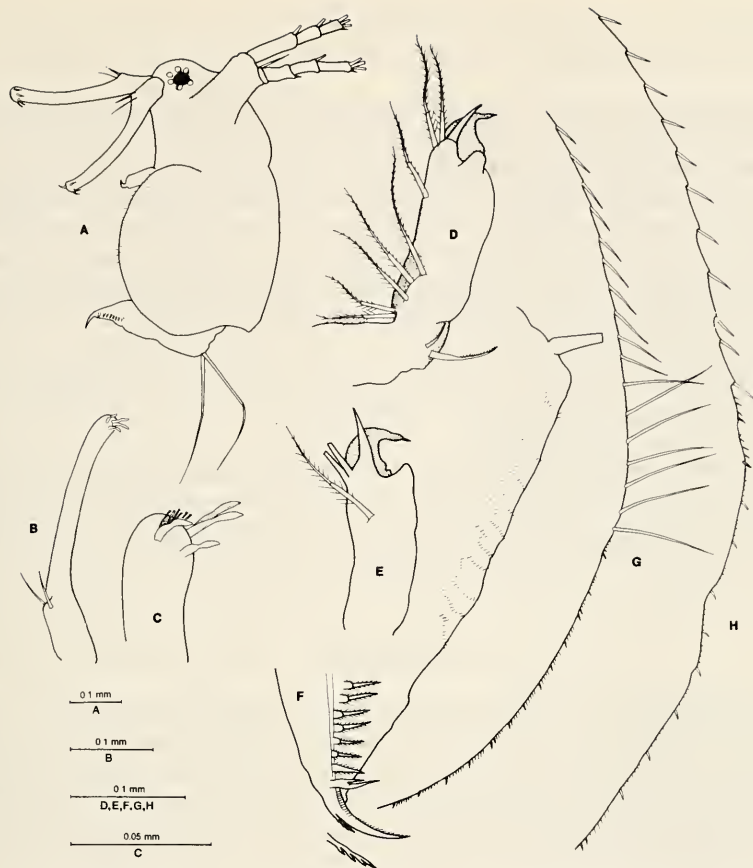


Fig. 3. *Moina weismanni* Ishikawa, 1896: A. Male, lateral aspect; B. Antennula of a male; C. Terminal part of the antennula of a male; D, E. First thoracic limb with a distal hook on the penultimate segment of a male; F. Postabdomen of a male; G. Ventral carapace rim of a male; H. Ventral carapace rim of a female.

both sides of this margin there are fine short setules arranged in wavy lines slanting distally towards the margin. The distal part of the postabdomen bears a row of 5–9 lateral feathered, identical teeth and a single distal bident tooth. The latter is very long, the distal arm being almost twice the length of the proximal arm. There is a row of short setules at the base of the bident tooth. The ventral claw's base has a "Basaldorn" with 4–5 sharply pointed teeth. The claw itself is long and slightly curved distally. At the dorsal base of the claw a pecten of 16–21 conspicuous setae is present. The remaining, distal part of the claw's margin is provided with a row of fine setules.

The ephippium (Fig. 2. A, B, C) contains a single oval egg. Most of the ephippium's surface is well-marked with polygonal reticulations. The cells are arranged in rows and in the central area raised up in the shape of a very high knob-like sclerotized protuberance. This feature is most noticeable when seen from the dorsal aspect. The remaining narrow peripheral part of the ephippium around the heavy structured and centrally embossed area, remains completely smooth, and non-reticulated.

#### Male

The size of the male is significantly smaller than that of the female, measuring 0.54 to 0.60 mm.

The head (Fig. 3. A) is disproportionately large and distinctly separated from the carapace. It is rounded in front and less indented above the eye. The large compound eye usually fills the apex of the head.

The antennula (Fig. 3. A, B, C) is long and broadly curved, and originates on the ventral margin of the head slightly behind its anterior extremity. It is bent at a point about one-fourth the distance from the head. Two sensory setae originate near the bend. The first is broad-based, and located on the medial margin, the second, slender, and located on the lateral margin of the antennula. The terminal part of the antennula bears four slightly recurved hooks and several short olfactory papillae.

The first thoracic limb (Fig. 3. D, E) has a small distal hook on the penultimate segment. The hooks of the right and the left side show mutual asymmetry in shape. Here also the exopod is lacking as in the female. The distal segment has a long spinelike seta that is less curved. From the side of this spine-like seta extend two long feathered setae.

The ventral carapace rim (Fig. 3. G) is armed with about 17 long setae increasing in size posteriorly, which is a peculiarity of this species. On the remaining part the ventral carapace rim is a fringe of short setules arranged in rows as in the female.

On the posterior margin of the head and the dorsal carapace margin no trace of a covering of setules could be seen. A dense pubescence is present only on the antero-ventral part of the carapace.

The postabdomen (Fig. 3. F) is similar to that of the female, but a little shorter. On the dorsal margin only sparse transverse rows of fine setules are present.

## Discussion

The above description of *M. weismanni* shows that our specimens are built almost totally identical to those found by Margaritora 1987 in Italy and Hudec 1988, 1989 in Panonia. This identity refers to: (1) The presence of rows of setules at the dorsal margin of the female postabdomen; (2) The armature of the ventral carapace rim in males; (3) The shape and surface structure of the ephippium (in dorsal view) for the time the female bears it and after its laying. These characters are unknown for the Far-Eastern forms, maybe because of their insufficient studying so far (see Goulden 1968 and Smirnov 1976).

Zoogeographically it seems that *M. weismanni* belongs to the southern element of the Palaearctic fauna, recently introduced in Europe. Such elements are already known among the Ostracoda: *Dole-rocypris sinensis*, *Tanycypris pellucida* and *Hemicypris anomala* (Petkovski, 1963, 1964), being examples, especially in the waters of rice fields.

*Moina weismanni* has been so far known from rice-fields and inundation pools from Japan, Cambodia, China, India and Uzbekistan. In Italy it is known from rice-fields, but in Panonia and Yugoslavia it is ascertained only in swampy inundation areas, but not in the rice plantings.

In Limnofauna Europaea (Illies, 1978) our localities are presented as Gebiet 6: Hellenischer Westbalkan.

## Acknowledgements

I would like to express my sincere thanks to Prof. Dr. Heinz Löffler, Zoological Institute of the University of Vienna, Austria, who reviewed the manuscript critically. Sincere thanks are also due to Prof. Dr. Geoffrey Fryer, Windermere, England, for reading of the contribution and helpful comments.

## References

- Brehm, V., 1951. Cladocera und Copepoda Calanoida von Cambodja. — *Cybium* (Bull. Assoc. Amis Lab. Peches colon., Mus. Natl. Hist. Nat. Paris) 6: 95–124
- 1953. Indische Diptomiden, Pseudodiptomiden und Cladoceren. — *Österr. Zool. Zeitschr.*, Wien 4 (3): 241–345
- Goulden, C. E., 1968. The systematics and evolution of the Moinidae. — *Trans. Amer. phil. Soc.*, Philadelphia, N. Ser. 58 (6): 1–101
- Hudec, I., 1989. *Moina weismanni* Ishikawa (Cladocera, Moinidae) from Central Europe. — *Hydrobiologia* (in press)
- Ishikawa, C., 1896. Phyllopod Crustacea of Japan. — *Zool. Mag. Tokyo* 8: 1–6
- Margaritora, F. G., Ferrari, I. & D. Crosetti, 1987. A Far East *Moina*, *M. weismanni* Ishikawa, 1896 found in an Italian ricefield. — *Hydrobiologia* 145: 93–103
- Markushin, A. B. & I. G. Markewitch, 1982. Ob obrazovanii efipia nekatorych Cladocera (Crustacea). — *Zool. Zh.* 61 (9): 1425–1427
- Petkovski, T., 1960. Süßwasserostracoden aus Jugoslavien, VII. — *Fragm. balcan. Mus. maced. Sci. nat.*, Skopje 3 (12/71): 1–8
- 1964. Bemerkenswerte Entomostraken aus Jugoslavien. — *Acta Mus. maced. Sci. nat.*, Skopje 9 (7/83): 1–36
- Sars, G. O., 1903. Fresh-water Entomostraca from China and Sumatra. — *Arch. Mathem. Naturvidenskab.* 25 (8): 1–44, pl. 1–4
- Smirnov, N. N. 1976. Macrothricidae i Moinidae fauny mira. — *Fauna SSSR, Akad. N. SSSR, Zool. Inst., N. Ser.* 112, Rakoobraznye, 1 (3): 1–257 (Ed. Nauka, Leningrad)
- Uéno, M., 1927. The freshwater Branchiopoda of Japan. — *Mem. Coll. Sci., Kyoto Imper. Univ.*, Ser. B 2 (5): 259–311, pl. 21–31
- 1939. Manchurian Freshwater Cladocera. — *Annot. Zool. Japan.* 18 (3): 219–231